Income, Value, and Returns in Socially Responsible Office Properties

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Abstract

"Responsible property investing" seeks to address social and environmental issues while achieving acceptable financial returns. It includes strategies such as investing in properties that are ENERGY STAR labeled, close to transit, and located in redevelopment areas. This study examines the financial performance of these types of properties. With few exceptions, over the past 10 years they had net operating incomes, market values, price appreciation, and total returns that were higher or the same as conventional properties, with lower cap rates. The findings reveal that responsible property investing can be practiced without diluting returns and can potentially yield higher profits for developers and investors.

Investors are increasingly interested in socially responsible investing (SRI) (Schueth, 2003; Hill, Ainscough, Shank, and Manullang, 2007), or "directing investment funds in ways that combine investors' financial objectives with their commitment to social concerns such as social justice, economic development, peace, or a healthy environment," (Haigh and Hazelton, 2004). A decade ago, Mansley (2000) predicted that property would join the debate on SRI because it lies at the frontline of many social and environmental concerns. For example, over half the world's greenhouse gas emissions come from operating buildings and the road transport between them (Metz, Davidson, Bosch, Dave, and Meyer, 2007).

SRI has grown into a global movement (Louche and Lydenberg, 2006). More than 600 institutions have signed the Principles for Responsible Investment (Principles for Responsible Investment, 2008) and in 2007 SRI investment in the United States encompassed nearly 11% of the total investment marketplace (Social Investment Forum, 2008). If just a tenth of the U.S. SRI investments had been committed to real estate, they would have equaled 87% of the total market capitalization of the U.S. REIT industry (NAREIT, 2009).

In addition to following their personal values, socially responsible investors seek to influence corporate behavior (Schueth, 2003). According to Rivoli (2003), this can be achieved thru shareholder activism, which can influence corporate decisions, and thru investment screening, which can alter equity prices, particularly if certain ‘‘unrealistic assumptions’’ about equity markets having perfect price elasticity are relaxed. Michelson, Wailes, van der Laan, and Frost (2004), however, reviewed the literature and found inconclusive evidence that SRI has affected corporate behavior. But Heinkel, Kraus, and Zechner (2001) have demonstrated theoretically that SRI will not induce reform until 20% of investors participate, and SRI has yet to reach that market share. Haigh and Hazelton (2004) argue that it only lacks the power *so far* to create significant corporate change.

When corporations focus on improving their social or environmental performance, they are practicing corporate social responsibility (CSR). According to Salzmann, Ionescu-Somers, and Steger (2005), theorists have argued the links between corporate financial and social or environmental performance are positive, neutral or negative, while empirical studies on the subject have been largely inconclusive. A recent review of 167 studies found that CSR neither harms nor improves returns, concluding that ‘‘companies can do good *and* do well, even if they don’t do well *by* doing good,’’ (Margolis and Elfenbein, 2008).

The application of SRI to the property sector is referred to as responsible property investing (RPI) (Mansley, 2000; McNamara, 2000; Newell and Acheampong, 2002; Boyd, 2005; Lutzkendorf and Lorenz, 2005; Pivo, 2005, 2008a; Pivo and McNamara, 2005; Rapson, Shiers, and Keeping, 2007; UNEP FI, 2007; Newell, 2008). The *Journal of Property Investment and Finance* recently published a special issue on the topic in which the editor argues that property has a role to play in every category of corporate responsibility including environment, workplace, diversity, community, and corporate governance (Roberts, 2009).

RPI is broadly concerned with investment and development decisions that are responsive to the social, environmental, and economic concerns of all affected stakeholders. Previously, professional real estate ethics has focused mostly on decision-making in the best interest of clients, unimpaired by personal self-interest (Levy and Terflinger, 1988). RPI, however, expands the range of parties whose interests’ decision makers should consider and seeks out investment and development strategies that improve the well-being of both immediate professional clients as well as other groups, such as neighbors, construction workers, maintenance personnel, building users, other species, and future generations.

Unfortunately, what little we know about the ethical standards among real estate professionals paints a less than flattering picture. Izzo (2000), using standardized measures of cognitive moral development, found that only 25% of Realtors were ‘‘principled,’’ or of the view that one should act according to universal ideas of justice and promote the general welfare. The rest exhibited either ‘‘conventional’’ moral reasoning, meaning they follow the law and do what’s expected of them, or ‘‘preconventional’’ reasoning, meaning they follow rules only when it’s in their immediate self-interest. Meanwhile, Velthouse and Kandogan (2006) found that the ‘‘aggregate ethics’’ rating for managers in the finance, insurance, and real estate (FIRE) sector was the lowest of the nine sectors studied.

However, contrary to these findings, more than 85% of U.S. property investment executives would increase their allocation to RPI if it met their risk and return criteria (Pivo, 2008b). They are concerned, however, about its potential financial performance. How ethically screened investments perform in comparison to conventional ones is a contentious issue (Michelson, Wailes, van der Laan, and Frost, 2004; Bauer, Koedijk, and Otten, 2005) and findings are mixed on whether investors will sacrifice financial returns for social responsibility (Rosen, Sandler, and Shani, 2005; Nilsson 2007; Vyvyan, Ng, and Brimble, 2007; Williams, 2007). But if RPI does harm values or returns, it will undoubtedly face resistance. The current study, therefore, examines the relationship between RPI, market value, and investment returns by comparing the financial performance of RPI and non-RPI office properties throughout the U.S. from 1999 to 2008.

A recent international survey of stakeholders that ranked RPI criteria was used to define and identify RPI properties. It concluded that the most important goals should be ''the creation of less automobile-dependent and more energy-efficient cities where worker well-being and urban revitalization are priorities,'' (Pivo, 2008b). Consequently, this study focuses on three specific types of office properties: those close to transit stations, those with the ENERGY STAR label, and those in urban revitalization areas.

Research Hypotheses

RPI features that affect occupancy, rent or operating expenses should affect net operating income (NOI). If transit improves accessibility (Geurs and van Wee, 2004), then properties near it should have higher rents and occupancy.[1] If energy efficiency lowers power bills (Kats and Perlman, 2006), then ENERGY STAR properties should have lower expenses.[2] And if business in redevelopment areas receive government incentives[3] (Lynch and Zax, 2008), then properties there could have higher rents and occupancy. Therefore, the first hypothesis is that properties near transit, energy efficient properties and properties in areas targeted for redevelopment have had a higher average NOI.

Since property values are a function of income flows and capitalization rates, RPI features that affect them should affect values. If RPI properties have higher NOI, then higher valuations are also expected. And if they are viewed as safer investments, their values should be even higher, assuming capitalization rates are inversely related to risk. Uncertainties about energy costs and regulations may have caused investors to view energy-efficient properties and properties near transit as safer investments. But weak demand in regeneration areas may have caused them to be seen as riskier. Alternatively, investors could have accepted lower cap rates for properties in revitalization areas if they saw greater potential for income growth by filling vacant spaces (Sivitanides, 1998). So, the second hypothesis is that properties near transit and energy efficient properties have had lower cap rates and higher values while the results in redevelopment areas are more ambiguous.

Total investment return is composed of appreciation and income returns. Superior appreciation can occur if incomes grow faster than previously anticipated, or if faster income growth or slower depreciation is expected in the future. Income return is the ratio of income to the property value at a given point in time. It is analogous to the capitalization rate. If an RPI property is expected to produce higher future incomes, it could produce higher appreciation and therefore be purchased at lower income returns in order to achieve the same total returns. That is, properties with more expected growth in income and value will tend to have lower cap rates.

For ENERGY STAR properties and properties near transit, we thought that trends over the past several years may have produced positive effects on appreciation and downward pressure on income returns, resulting in a neutral effect on total returns. Trends in gas and electricity prices (see Exhibit 1) illustrates why this may have been so. It shows the increase in gasoline and electricity prices for the three most recent five-year periods. In the last two, prices grew much faster than before. If we assume investors had been projecting future costs based on past trends, they would have projected slower increases than actually occurred. A discontinuity in prices could have produced an unexpected shift in demand toward energy efficient and transit-oriented properties, causing their incomes to grow faster than anticipated and producing superior appreciation. Meanwhile, growing concern about the risks of owning energy inefficient and auto dependent properties may have produced downward pressure on cap rates for ENERGY STAR and transit-oriented properties, lowering their income returns. The net result on total returns, however, may well have been neutral. So, our third hypothesis was that energy efficient and transit-oriented properties have generated a higher appreciation return and a lower income return (cap rate) than otherwise similar properties.

Exhibit 1 | Trends in Gas and Electricity Prices (mean annual percent change)

	1993–1998	1998–2003	2003–2008
Gasoline, regular grade, nominal price	−0.08	9.5	14.6
Electricity, end use commercial sector, nominal price	−1.3	1.6	4.4

Note: Data from the U.S. Department of Energy, Energy Information Administration.

Literature Review

The only studies to directly examine the empirical effects of redevelopment programs on non-residential property come from the United Kingdom. Erickson and Syms (1986) found that properties in enterprise zones commanded higher rents. Twenty years later, McGreal, Webb, Adair, and Berry (2006) found that returns in urban renewal districts matched returns for conventional properties. Both studies support the hypotheses proposed here that properties in redevelopment areas have had higher incomes and similar returns compared to properties outside redevelopment areas. Malizia (2003), however, using qualitative methods, found that participants in redevelopment projects viewed them as riskier investments and that appraisers apply higher cap rates to reflect that risk.

Four studies have found rent and price premiums in energy-efficient office buildings (Fuerst and McAllister, 2008; Miller, Spivey, and Florance, 2008; Wiley, Benefield, and Johnson, 2008; Eichholtz, Kok, and Quigley, 2009). Miller, Spivey, and Florance (2008) also found lower cap rates. Studies on housing produced similar results: efficiency was capitalized into value (Corgel, Goebel, and Wade, 1982; Longstreth, 1986; Laquatra, 1986; Dinan and Miranowski, 1989). These studies support the premise that energy efficiency benefits incomes and values. No prior work on energy efficiency and investment returns was found.

Cervero, Ferrell, and Murphy (2002) summarized the prior research on transit. They concluded that ''numerous studies have demonstrated that being near rail stops raises property values.'' Benjamin and Sirmans (1996), working on Washington D.C. apartment rents, also found a positive effect for proximity to transit. Some studies, however, have reached contrary conclusions (Nelson, 1992; Gatzlaff and Smith, 1993; Bollinger, Ihlanfeldt and Bowes, 1998). Since Cervero, Ferrell, and Murphy (2002), three more papers have been published. Ryan (2005) found that access to light rail transit in San Diego was insignificant for office and industrial rents while Duncan (2008) found it was positive for single-family home and condominium values. Meanwhile, Hess and Almeida (2007) found that light rail stations in Buffalo increased single-family home values while Portnov, Genkin, and Barzila (2009) found that urban rail lines had a negative effect on multi-story apartment sale prices within 100 meters of the tracks and then a positive effect beyond. Most of this literature focuses on rents and valuations. Only one study examined appreciation. Clower and Weinstein (2002) found that office property values near Dallas light rail stations increased at more than twice the rate of other properties from 1997 to 2001.

Overall, prior quantitative studies show that properties in redevelopment areas commanded higher rents but did not outperform on returns, that energy efficient properties had higher rents and values, and that in several instances properties near transit were more valuable and appreciated faster than in other locations. This paper tests the validity of these findings and thereby strengthens our general understanding. This paper reports the first findings on office incomes, values, and returns in U.S. areas receiving economic development incentives. It also offers the first look at investment returns for energy efficient offices, and while it is not the first study to look at office returns near transit, it is just the second to do so and the first to do it on a national scale. Indeed, a strength of this project was its use of national data. Only the papers cited on energy-efficient offices used national data. Most studies looked at one or a few metropolitan areas, restricting their ability to make national generalizations, which are useful to developers and investors operating on a national scale.

Methods and Data

The following model was used to test the hypotheses:

$$P_{ij} = f(R_i, N_j, E_{ij}, R_i, A_i, Q_i, G_{ij}, u_i). \quad (1)$$

Where:

P_{ij} = A vector of variables describing the performance of the *i*th property in year *j*;
R_j = A vector of variables describing the RPI features of the *i*th property;
N_j = The national office market conditions in year *j*;
E_{ij} = A vector of variables describing the economy in the region of the *i*th property in year *j*;
R_i = The regional location of the *i*th property;
A_i = A vector of variables describing the accessibility conditions for the *i*th property;
Q_i = A vector of variables describing the quality of the *i*th property;
G_i = A vector of variables describing the cost of government services for the *i*th property in year *j*; and
u_i = A stochastic term.

There was also an examination as to whether there would be any a priori interaction between the RPI variables (i.e., whether their effect on performance should depend on whether a property had any of the other RPI features studied). The findings revealed there would not be. Several other interactions were examined but they did not add any explanatory power to the model. Consequently, to avoid reducing parsimony and increasing the difficulty of interpretation, interaction variables were not included in the model.

Quarterly data for 1999–2008 were compiled for office properties from data maintained by the National Council of Real Estate Investment Fiduciaries (NCREIF). NCREIF is a source of real estate performance information based on property-level data submitted by its data contributing members, which include institutional investors and investment managers. Properties are added to or removed from the database as members acquire or sell holdings. The sample consisted of all the office properties in the NCREIF database that had complete addresses and could be geocoded. That came to 1,199 properties with a total market value of about $98 billion. The addresses were needed in order to obtain information from other data sources (discussed further below). Since properties are added to and deleted from the dataset as they are bought and sold, the number of properties in the sample varied somewhat over time. The number of observations in any particular regression ranged from approximately 6,000 to 7,500 depending on the specific variables used because of missing data for some properties. Exhibit 2 summarizes the variables and gives their descriptive statistics.

Financial Performance Variables

To examine the impact of RPI on values, NCREIF provided appraised values for the properties that had not sold and transaction prices for properties that had sold—the same appraisals and transaction prices used to calculate the quarterly NCREIF Property Index. Many of the other models examined such as NOI, expenses, occupancy, etc. were based on actual accounting data gathered by NCRIEF from the building owners. Those data did not come from appraisers and were not survey data.

Many studies have shown that appraised values tend to lag transaction prices by a few quarters in appraisal-based indices (Geltner and Ling, 2006). One reason for this is the nature of the appraisal process, which relies on historical data such as comparable sales. Another reason is that not all properties are actually revalued every quarter. Some may only be revalued two or three times a year. However, virtually all of the properties in the NCREIF set are revalued at least once a year. Since the purpose of this study was to examine cross-sectional differences in property values as a result of different RPI characteristics, a delay of a quarter or two in updating the appraised value of a particular property would not significantly impact the relative cross-sectional differences in properties. In other words, since properties with and without a particular RPI characteristic have the same appraisal lag, the cross-sectional comparisons are on an apples-to-apples basis.

It should be noted that bias associated with appraisal smoothing at the individual property level is different from that at the index level. There are ‘‘unsmoothing techniques’’ that can be applied at the index level to account for the fact that not all properties are revalued every quarter (Fisher and Geltner, 2000). But this is not appropriate for individual properties. The problem caused by individual properties not being revalued every quarter is that in those quarters the property is not revalued, there will be no change in value and the return is biased toward zero. Furthermore, when there is a revaluation, the return will reflect all the change in value since the last appraisal. Since properties in the index are revalued at least once a year, a four quarter moving average of returns was used as the dependent

Exhibit 2 | Variables, Definitions, Observations, and Descriptive Statistics

Variables	Description	Count	Mean	Std. Dev.	Min.	Max.
Performance Vector						
NOI_SF_YR	Net operating income (dollars) per square foot per year.	13135	14.04	6.22	−46.07	66.46
MV_ SF	Market value (dollars) of the property at the end of the quarter.	11957	229.11	176.16	0.00	2851.68
INCRET_YR	Average income return (cap rate) for the current and prior three quarters.	9765	0.07	0.04	0.93	2.86
APPRET_YR	Average capital return for the current and prior three quarters.	9765	0.04	0.20	−0.19	11.77
TOTRET_YR	Average total return for the current and prior three quarters.	9765	0.12	0.21	0.31	12.36
INCTOTSF_YR	The total rental income (dollars) per square foot over the past year including expense reimbursements	9188	28.63	28.65	0.21	849.73
OCC	Percent property occupancy.	12630	0.89	0.13	0.06	1.00
EXPTOTSF_YR	Total expenses (dollars) per square foot over the past year.	9305	11.58	11.14	0.01	385.10
RPI Features						
ESTAR	Dummy variable for ENERGY STAR labeled.	12542	0.11	0.32	0.00	1.00
REGENCB	Dummy variable for in or near CBD regeneration area.	12542	0.03	0.16	0.00	1.00
REGENSU	Dummy variable for in or near suburban regeneration area.	12542	0.02	0.14	0.00	1.00
TRANSITCB	Dummy variable for within ½ mile of nearest fixed rail transit station in a CBD.	13145	0.14	0.35	0.00	1.00
TRANSITSU	Dummy variable for within ½ mile of nearest fixed rail transit station in a suburb.	13145	0.12	0.33	0.00	1.00

Exhibit 2 | (continued)

Variables, Definitions, Observations, and Descriptive Statistics

Variables	Description	Count	Mean	Std. Dev.	Min.	Max.
National Market Conditions						
OFFICETOTRET	Quarterly return for all office properties in the NCREIF Office Property Index.	13145	0.02	0.03	−0.09	0.06
Regional Economy						
CEMP123	9 quarter moving average employment growth rate in the CBSA, expressed annually.	9184	0.95	1.70	−6.83	6.87
STA123	9 quarter moving average office building growth rate in the CBSA, expressed annually.	13141	1.97	1.34	0.17	13.25
OCC_CBSA	Mean quarterly percent occupancy for all NCREIF office properties in the CBSA.	47263	0.91	0.06	0.02	1.00
Regional Location						
CBSA	Dummy variables for the state.					
Accessibility Conditions						
TRAVHOMEWORK	Mean travel time in minutes from home to work by all modes for all workers in the census tract.	12936	24.20	5.50	4.00	46.00
BLK_GP_POPDEN	2007 census block group population density.	13145	6518.62	12023.82	0.00	110566.7
STYPE	Dummy variable for in CBD.	13145	0.19	0.40	0.00	1.00
MSADENS	Population density of the CBSA in persons per acre.	9184	6.82	0.83	4.61	8.81
Property Quality						
SQFT	Square feet of the building.	13145	271168.5	364378.4	8022	2.26E+07
FLOORS	Number of floors.	13145	7.52	9.94	0.00	76.00
AGE	Age of the property in years.	11899	19.91	17.30	0.00	123.00
Cost of Government Services						
EFFPROPTAX	Effective property tax rate in the quarter for the CBSA.	12586	0.02	0.01	0.00	0.23

variable, which allowed better capture of the trend in returns than using single quarter returns. Each observation reflected how values had changed on average over the past four quarters rather than having some quarters with no change in value and others with too high (or too negative) a change in value that reflected more than one quarter. Because quarterly returns tended to be correlated over time, a panel regression with clustering at both the property and year level was used as a robustness test to be sure the independent variables of interest were still significant and they were.

RPI Variables

ENERGY STAR labeling was used to define whether or not a property was energy efficient. Labeling information was collected from the U.S. EPA ENERGY STAR Program. To be labeled, a building must be in the top quartile of energy efficiency when compared to peers (i.e., office buildings with similar operational characteristics including size, weather conditions, number of occupants, number of computers, and hours of operation per week).

Data on the latitude and longitude of all U.S. fixed rail transit stations were obtained from the U.S. Bureau of Transportation Statistics (BTS), National Transportation Atlas Database. This included stations for commuter trains, heavy rail, light rail, and monorail. Supplemental data from Google Earth were used for the New York area. The straight line distance from each property to the nearest rail transit station was measured using GIS software. Properties that were a half mile or less from a transit station were categorized as transit-oriented properties.[4]

Data used to define urban regeneration properties came from the U.S. Department of Housing and Urban Development (HUD). They were defined as those located in or near an Empowerment Zone, Renewal Community, or Enterprise Community as defined by HUD's online RC/EZ/EC Address Locator.

Controls Variables

As indicated by Equation (1), several controls were used to isolate the effects of the RPI features on property performance. National market conditions each year were controlled with the NCREIF office market index. Regional economic conditions were controlled with the yearly growth rate of office buildings in the region as a measure of local supply, the yearly regional employment growth rate as a measure of local demand, and office occupancy rates as a measure of supply/demand balance. Since the NCREIF office market index for each year controls for changes in the national market over time, the regional supply, demand, and occupancy variables only captured differences between CBSAs. CBSA dummy variables controlled for static regional conditions not otherwise controlled.

Four variables were used to control for intraregional location and accessibility conditions. Regional accessibility at each property location was controlled using the mean travel time to work from homes in the census tract and the population density in the census block group. While others have used traditional gravity-based and distance to CBD measures (Song, 1996; Geurs and Wee, 2004), it is infeasible in the current study given the large number of properties and regions in the study. Levinson (1997) demonstrates that journey to work time is a good proxy for gravity-based accessibility measures and Heikkila and Peiser (1992) show that accessibility co-varies with urban density at the block group level. A dummy for whether or not properties were in a CBD provided additional control on access to the CBD. Metropolitan-level population density was used as a proxy for regional congestion and mobility. The findings reveal that population density at the metro scale is correlated with direct congestion measures published by the Texas Transportation Institute ($r = .45 - .55$) but their measures were unavailable for all regions in the study. Note that this density measure is for the entire metropolitan area and does not measure density in the vicinity of each property. It should not be confused with the measures for accessibility at the property scale, including block group population density.

Size and age were used to control for quality. Building class, another measure of building quality, has been found to be related to rent and values (Glascock, Jahanian, and Sirmans, 1990; Eichholtz, Kok, and Quigley, 2009) but it was unavailable for this study. However, ''classifications of offices are far from precise'' and typically rely on vintage and location to make class distinctions (Archer and Smith, 2003), which are controlled for in the current study using age and the location variables, along with stories (*FLOORS*) and stories squared (*FLOORS2*), which are most likely related to the ''market presence'' dimension of building class. Finishes and building systems are not directly controlled for, which are additional elements of class, but they probably co-vary with the variables that are controlled. Evidence that age and stories can substitute for class can be found in Eichholtz, Kok, and Quigley (2009), which presents models estimating office rent and values. In their models, the coefficients for Class A and B dummies are reduced by about half when variables for age and stories are introduced. Nevertheless, Dermisi and McDonald (2010) have found that for Chicago office buildings, Class A increased selling price per square foot compared to Class B, holding numerous other building features constant. It would seem, then, that the findings could be improved by introducing building class as a control variable.

The effective tax rate paid by each property was computed from NCREIF tax expenditure and property value data. The mean rate at the CBSA level was used to control for the cost of local government services, although no control was introduced for any government or utility incentives provided to RPI properties. As discussed in endnotes 1–3, some RPI properties, depending on their location, can benefit from economic incentives that may increase their income and value. If these were controlled in the analysis, any positive effects of RPI features would likely be diminished. And in the case of the redevelopment properties studied, which by definition are eligible for federal incentives, controls for financial incentives would probably eliminate all significant effects. Consequently, changes to pertinent incentive programs would likely alter the relationships found in this study.

Separate dummy variables were included for two of the RPI characteristics (near transit and in or near urban regeneration zones) to indicate whether a property had these characteristics and was in a CBD or suburb. For example, *TRANSITCB* was 1 if the property was near transit in the CBD and 0 otherwise (meaning that it was not near transit in either a CBD or a suburb or near transit in a suburb). Similarly *TRANSITSU* was 1 if it was near transit in a suburb and 0 otherwise. There is also a dummy variable, *STYPE*, indicating whether a property was in a CBD or suburb, regardless of whether it had an RPI characteristic or not. If *STYPE* was 1, the property was in a CBD and if it was 0, it was in a suburb. With this structure of dummy variables, what the *STYPE* variable captured was the difference that being in a CBD versus a suburb had on ENERGY STAR and non-RPI properties because the relative impact of the transit and urban regeneration RPI variables caused by being in a CBD or suburb was already captured in the dummy variables included for these characteristics. For example, if the only RPI variables in a regression were *TRANSITCB* and *TRANSITSU*, with the market value as the dependent variable, then *STYPE* captured the difference in market value for the non-transit property in a CBD compared to the non-transit property in the suburb. Meanwhile, the *TRANSITCB* variable captured the marginal impact on market value of being near transit in a CBD relative to not being near transit in a CBD. Likewise, the *TRANSITSU* variable captured the marginal impact on market value of being near transit in a suburb versus not being near transit in a suburb. This setup for the dummy variables permitted capture of the impact of each RPI variable in the CBD relative to those properties that did not have this RPI characteristic in a CBD and similarly in a suburb. As will be shown, the impact of some of the RPI characteristics is different in a CBD than in a suburb. Although *STYPE* could be omitted and a dummy variable added to indicate whether a property did not have one of the RPI characteristics in, say, a CBD (with not having the RPI characteristic in the suburb being the omitted dummy variable), this would cause dependency problems among the independent variables when there is more than one RPI characteristic because the dummies for each set of RPI variables define whether the property is in a CBD or not.

Exhibit 3 gives the correlations between the independent variables. There was a fairly strong correlation (0.81) between *STYPE* and *TRANSITCB*. *STYPE* and *TRANSITCB* could be proxies for one another, but the fact that *STYPE* and *TRANSITSU* were not highly negatively correlated suggests this was not the case. Nonetheless, their correlation could have caused multicollinearity problems in the regressions, so large changes in estimated regression coefficients were looked for when *STYPE* and *TRANSITSU* were added and deleted from the models. None occurred, so it was unlikely that there was a significant problem with having both variables in the models.

Exhibit 3 | Correlation Coefficients for the Independent Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. *ESTAR*	1																	
2. *REGENCB*	−.01	1																
3. *REGENSU*	−.03	−.02	1															
4. *TRANSITSU*	.04	−.06	.22	1														
5. *TRANSITCB*	.03	.33	−.04	−.15	1													
6. *CEMP123*	−.01	−.12	−.05	−.04	−.13	1												
7. *STA123*	−.12	−.05	−.04	−.03	−.17	.36	1											
8. *OFFICETOTRET*	.09	−.02	.01	.06	.04	.24	−.48	1										
9. *AGE*	−.14	.22	.03	.04	.40	−.12	−.18	.05	1									
10. *FLOORS*	.33	.04	.20	.20	.37	−.14	−.10	.01	.16	1								
11. *SQFT*	.11	−.04	.06	.06	.13	−.09	−.08	.01	.07	.36	1							
12. *EFFPROPTAX*	−.04	.03	−.03	−.11	.16	−.20	−.08	−.11	.11	.09	.02	1						
13. *TRAVHOMEWORK*	−.04	−.15	−.10	−.07	−.17	.01	−.13	.03	−.17	−.21	−.04	−.10	1					
14. *BLK_GP_POPDEN*	.04	.11	−.03	.08	.46	−.08	−.13	.04	.22	.33	.15	0	−.06	1				
15. *MSADENS*	−.04	−.02	−.02	−.05	.34	−.20	−.38	.05	.32	.17	.12	.02	.21	.40	1			
16. *STYPE*	.03	.35	−.06	−.18	.81	−.07	−.08	.01	.40	.46	.18	.13	−.26	.40	.20	1		
17. *OCC*	.03	.03	−.03	.01	.04	.11	−.05	.08	−.08	0	.01	−.12	−.01	.05	.06	.03	1	
18. *OCC_CBSA*	.02	0	.04	−.01	.04	.36	−.17	.27	−.04	−.02	.01	−.19	.11	.14	.14	.01	.26	1

Results and Discussion

In most cases, the controls in the regression analyses were significant and had the expected signs. R-squares varied depending on the regression. The focus, however, was on the significance of the RPI variables and not the predictive power of the models.

Income and Market Value

The following two models use log transformed dependent variables to reduce skewness and facilitate interpretability of the coefficients. The models show that over the past 10 years, RPI properties had NOIs and market values per square foot that were equal to or higher than conventional office investments. In no case did the RPI features harm incomes or values.

Net Operating Income (NOI) per Square Foot. As indicated by the coefficients in Exhibit 4, the NOI per square foot for ENERGY STAR properties was 2.7% higher than for non ENERGY STAR properties and 8.2% higher for CBD regeneration properties compared to other CBD offices. Suburban regeneration and transit properties had NOIs that were similar to non-RPI properties.

As already discussed, higher NOI can be from higher rents, higher occupancy or lower expenses. To determine which of these might be driving the higher NOIs, *ESTAR* and *REGENCB* were used as dependent variables in separated regression models to see if they could explain rents, occupancy, and expenses. The findings show that ENERGY STAR properties had 5.2% higher rents than other properties and CBD regeneration properties had 4.8% higher rents than other CBD offices, although the later was statistically insignificant. This ENERGY STAR rent premium is less than the 7.3% to 11.6% premium found by others (Eichholtz, Kok, and Quigley, 2008; Fuerst and McAllister 2008; Wiley, Benefield, and Johnson, 2008). Occupancy was 1.3% higher for ENERGY STAR properties and 0.2% higher for the CBD regeneration properties, but the later was again insignificant. Both properties had lower total operating expenses but neither result was statistically significant.

Surprisingly, there was no significant difference in total operating expenses for the ENERGY STAR properties. So as a further test, a regression was performed for just utility expenses per square foot. Because utility costs can change over time and vary across CBSAs, dummy variables were used for the year and quarter, as well as the CBSA. And since utility rates can vary within CBSAs, depending on the service provider, income per square foot was used as a proxy to control for these differences, assuming that areas with higher utility costs could charge higher rents. Utility expenses were in fact 12.9% lower per square foot per year for ENERGY STAR offices. So, in addition to higher rents and occupancy, the NOIs for ENERGY STAR properties were also boosted by lower energy bills.

Exhibit 4 | OLS Parameter Estimates for *logNOI_SF_YR*

	Coeff.	Std. Err.	*p*-value
Intercept	0.985	0.151	0.000
ESTAR	0.027	0.014	0.045
REGENSU	−0.039	0.036	0.276
REGENCB	0.082	0.027	0.002
TRANSITSU	0.015	0.014	0.284
TRANSITCB	−0.025	0.024	0.300
CEMP123	0.008	0.004	0.027
STA123	0.033	0.006	0.000
OFFICETOTRET	−1.030	0.330	0.002
OCC_CBSA	1.350	0.084	0.000
AGE	−0.001	0.000	0.000
FLOORS	0.004	0.001	0.000
FLOORS2	−0.000	0.000	0.014
SQFT	−3.09e-08	1.01e-08	0.002
EFFPROPTAX	−3.898	0.420	0.000
TRAVHOMEWORK	−0.003	0.001	0.001
BLK_GP_POPDEN	6.96e-07	3.61e-07	0.054
MSADENS	0.000	5.78e-06	0.001
STYPE	0.063	0.021	0.003

Note: The CBSA dummies are not shown. Number of observations: 7,627; F-Statistic = 103.17; R^2 = 0.485; Adj. R^2 = 0.480.

Overall, the kinds of RPI properties studied here had NOIs equal to or better than non RPI properties. The efforts to explain the higher NOIs had mixed results. For the ENERGY STAR properties, there was significant evidence of higher rents per square foot, higher occupancy, and lower utility bills. The CBD regeneration properties had higher rents, higher occupancy, and lower expenses but the findings were not statistically significant, though they may not have been accidental since the NOIs were significantly lower.

Market Value per Square Foot. Higher NOIs should produce higher property values, assuming the same level of risk, and that is in fact what was found. This suggests that the effects of RPI features on NOI were being capitalized into market values. There were also cases of higher values without higher NOI, where higher values were probably being driven by lower capitalization rates.

As indicated by the coefficients in Exhibit 5, ENERGY STAR properties were worth 8.5% more per square foot than other properties.[5] This compares to value

Exhibit 5 | OLS Parameter Estimates for *logMV_SF*

	Coeff.	Std. Err.	*p*-value
Intercept	3.952	0.153	0.000
ESTAR	0.085	0.014	0.000
REGENSU	−0.033	0.037	0.375
REGENCB	0.067	0.027	0.014
TRANSITSU	0.106	0.014	0.000
TRANSITCB	0.091	0.024	0.000
CEMP123	0.024	0.004	0.000
STA123	0.002	0.006	0.773
OFFICETOTRET	6.608	0.334	0.000
OCC_CBSA	0.760	0.086	0.000
AGE	−0.006	0.000	0.000
FLOORS	0.011	0.001	0.000
FLOORS2	−0.000	0.000	0.010
SQFT	−1.76e-07	1.03e-08	0.000
EFFPROPTAX	−8.636	0.427	0.000
TRAVHOMEWORK	−0.018	0.001	0.000
BLK_GP_POPDEN	1.32e-06	3.66e-07	0.000
MSADENS	0.000	5.86e-06	0.000
STYPE	0.077	0.022	0.000

Note: The CBSA dummies are not shown. Number of observations: 7,627; F-Statistic = 162.84; R^2 = 0.597; Adj. R^2 = 0.594.

premiums of 5.8% to 19.1% reported in other recent studies (Eichholtz, Kok, and Quigley, 2008; Fuerst and McAllister, 2008; Miller, Spivey, and Florance, 2008; Wiley, Benefield, and Johnson, 2008). The results fall into the lower range of these other findings, but the other studies model exchange prices rather than appraised values and appraised values can lag behind exchange values, as already noted. And if the value of ENERGY STAR properties grew most quickly in the later part of the study period, then a lag of a few quarters could be significant. Other possible explanations for the lower premium could be that the other studies used different samples and fewer controls. Nonetheless, the results are consistent with the conclusion of every study to date: there has been a significant value premium associated with ENERGY STAR properties.

Market values for regeneration properties were no different from other properties in the suburbs and 6.7% higher in the CBDs. Properties near transit were 10.6% more valuable per square foot in the suburbs and 9.15% more valuable in the

CBDs. These are also notable results, indicating again that the RPI features in this study appear to range from neutral to quite positive for property values.

The RPI properties that had higher NOIs (ENERGY STAR and CBD regeneration) also had higher market values, as expected; however, for ENERGY STAR properties the value premium was more than triple the NOI premium. In addition, both types of transit properties had higher values without higher NOIs. But value is a function of both NOI and capitalization rate, and as shown in the next section, the value premiums that cannot be explained by higher NOIs can be explained by lower cap rates.

Investment Returns

The next three models examine the impact of RPI features on investment returns. The log of 1 + return was used as the dependent variable because returns could be negative. Many of the controls were dropped because they were not significantly related to returns. Overall, the RPI features did not affect total returns. However, when disaggregated into income and appreciation returns, lower income returns were found for most of the RPI property types, suggesting that they were favored in the capital asset market and that owners were willing to buy these properties at a lower capitalization rate.

Income Returns. As indicated in Exhibit 6, ENERGY STAR lowered income returns by 0.5% (rounded from 52 basis points). There are three possible explanations for these results. First, owners might have been anticipating higher income growth, faster appreciation or slower depreciation. Second, owners might have been anticipating slower growth in operating expenses. And third, owners might have viewed these properties as less exposed to risks from energy shocks and regulations. It is remarkable that Miller, Spivey, and Florance (2004), working with a different sample, found that taken together, LEED certified and ENERGY STAR labeled buildings had cap rates that were 55 basis points lower than other properties, which is nearly identical to the results of this study.

Proximity to transit reduced income returns by 0.4% in the suburbs and 1.5% in the CBDs. In this case, concerns about gas prices, carbon taxes, traffic congestion, and accessibility issues, along with forecasted growth in demand toward transit properties (Center for Transit Oriented Development, 2004), may have been shaping what investors were willing to pay for less auto-dependent properties.

The lower capitalization rates for certain types of RPI properties help explain the higher market values, which could not be fully explained by higher NOIs. In particular, while a 8.5% higher market value per square foot in ENERGY STAR properties could not be explained by just 2.7% higher NOI, it could be explained by a combination of higher NOI and lower cap rates.[6] Transit properties had higher market values without higher NOIs. Here again, the gap could be explained by lower cap rates. The reverse was also true: when the 6.7% higher market value in CBD regeneration properties was *less* than the 8.2% increase in NOI, a *higher*

Exhibit 6 | OLS Parameter Estimates for *logINCRET_YR*

	Coeff.	Std. Err.	*p*-value
Intercept	0.972	0.162	0.000
ESTAR	−0.005	0.001	0.000
REGENSU	−0.003	0.003	0.390
REGENCB	0.005	0.003	0.091
TRANSITSU	−0.004	0.001	0.001
TRANSITCB	−0.015	0.002	0.000
CEMP123	−0.003	0.000	0.000
STA123	0.002	0.001	0.028
OFFICETOTRET	−0.281	0.045	0.000
OCCUPANCY	0.099	0.003	0.000
OCC_CBSA	−0.017	0.010	0.101
MSADENS	−0.000	0.000	0.000
STYPE	0.004	0.002	0.082

Note: The CBSA dummies are not shown. Number of observations: 6,039; F-Statistic = 33.72; R^2 = 0.301; Adj. R^2 = 0.292.

cap rate explained the difference. So, in general it appears that certain types of RPI properties have been associated with lower income returns and cap rates and that these, in combination with other significant effects on NOI, have driven higher market values for RPI properties.

Capital Appreciation Returns. Exhibit 7 gives the regression results for appreciation return. In most cases, appreciation for RPI properties was similar to other properties. In two cases, however, RPI features did seem to affect appreciation. For suburban transit stations, the impact was positive; they appreciated 1.2% more quickly per year than other suburban properties. This could indicate that owners and buyers were increasing the value of these properties faster than for other properties in response to faster than expected income growth. They may also have been adjusting cap rates downward in expectation of better future income growth, slower depreciation, or lower risk. Given the previous findings that suburban transit properties did not have higher incomes but did have lower cap rates, the second explanation seems more plausible. For suburban regeneration properties, appreciation returns were slightly negative, although the results were only significant at the .10 level. Owners may have expected these properties to generate better incomes than they actually did, so their values could have been adjusting downward in response to the disappointing incomes. They did have lower NOI (Exhibit 4), but the results were not statistically significant. There could also have been growing concerns about future performance.

Exhibit 7 | OLS Parameter Estimates for *logAPPRET_YR*

	Coeff.	Std. Err.	*p*-value
Intercept	−0.360	0.200	0.000
ESTAR	0.000	0.006	0.979
REGENSU	−0.024	0.014	0.073
REGENCB	−0.009	0.012	0.459
TRANSITSU	0.012	0.006	0.030
TRANSITCB	0.011	0.011	0.295
CEMP123	0.016	0.002	0.000
STA123	−0.041	0.003	0.000
OFFICETOTRET	1.164	0.200	0.000
OCCUPANCY	0.142	0.012	0.000
OCC_CBSA	0.168	0.045	0.000
MSADENS	0.000	0.000	0.000
STYPE	0.013	0.009	0.164

Note: The CBSA dummies are not shown. Number of observations: 6,038; F-Statistic = 30.92; R^2 = 0.283; Adj. R^2 = 0.274.

Total Returns. Exhibit 8 gives the regression results for the log of annual total returns. Total returns includes appreciation (or depreciation), realized capital gain (or loss), and income. It captures the net result of RPI features on appreciation and income returns. Generally, RPI features did not significantly change total returns.

The coefficient for ENERGY STAR was negative, for example, but not significantly so. Lower income returns seem to have been offset just enough by higher appreciation returns to produce an insignificant net outcome for total returns. This does not mean, however, that developers of new ENERGY STAR properties or energy efficiency retrofit projects did not earn a greater than market return. Since ENERGY STAR properties have a higher market value, properties that are built or refurbished to achieve the ENERGY STAR label could well produce superior returns for their developers and investors. Developers could have made normal or above normal profits so long as the added value exceeded any additional cost of making the project ENERGY STAR qualified. This could not be said f the market value for ENERGY STAR properties had not been above the norm. According to Goldman, Hopper, and Osborne (2005), the typical energy efficiency retrofit project in the private sector (which may or may not be sufficient to achieve ENERGY STAR status) costs about $1.39 per square foot, or just 0.6% of the mean market value of the properties in the current study. They also find a median simple payback, based on energy bill savings alone, of 2.1 to 3.9 years.

Exhibit 8 | OLS Parameter Estimates for *logTOTRET_YR*

	Coeff.	Std. Err.	*p*-value
Intercept	−2.054	0.712	0.004
ESTAR	−0.005	0.006	0.380
REGENSU	−0.025	0.013	0.060
REGENCB	−0.005	0.012	0.713
TRANSITSU	0.007	0.006	0.236
TRANSITCB	−0.004	0.012	0.713
CEMP123	0.013	0.002	0.000
STA123	−0.034	0.003	0.000
OFFICETOTRET	0.879	0.198	0.000
OCCUPANCY	0.237	0.012	0.000
OCC_CBSA	0.147	0.044	0.001
MSADENS	0.000	0.000	0.078
STYPE	0.016	0.009	0.156

Note: The CBSA dummies are not shown. Number of observations: 6,039; F-Statistic = 28.46; R^2 = 0.267; Adj. R^2 = 0.257.

These payback rates were computed without considering any benefits to market values. Meanwhile, a recent review of several studies found that new green buildings, which often qualify for the ENERGY STAR label, can be built with a 1% to 2% cost premium and often with no premium at all (Morris, 2007). All these costs are well below the 8.5% value premium found for ENERGY STAR properties, suggesting that developers may indeed be able to capture most of the energy efficiency premium by developing or refurbishing properties to achieve the ENERGY STAR label.

The same can be said for the suburban and CBD transit properties and for the CBD regeneration properties. In those cases, newly developed properties could earn market or above market returns because they are valued at 8% to 10% higher per square foot, so long as any added development cost do not exhaust these premiums. There could be higher land, site preparation, and permitting expenses near transit stations, but government programs could also be in place to offset these added expenses. Generally, developers report positive views about developing near transit (Cervero et al., 2004). However, investors who purchase any of these properties from the developers who create them, and who pay the higher prices reported here, should not expect to see above market total returns, based on the record of the past 10 years. Nor should they expect a penalty. RPI can be employed as an investment strategy without harming returns, but if there's an advantage to be gained, it appears that it's most likely to be gained by developers if they can produce these properties without extra costs that exhaust the premiums. More research into the costs of developing RPI properties would appear to be a fruitful area for future investigations.

The one exception to our finding that RPI features were neutral or positive for total returns was the suburban regeneration properties. They produced slightly lower total returns, although the findings are only significant at the 0.06 level. This result was probably due to the lower appreciation, which was also barely significant. It is possible, however, that once prices have been fully adjusted to reflect realistic risk and income expectations, future investors will be able to develop and acquire these properties without a loss in future returns. Nonetheless, this demonstrates that RPI is not a risk-free strategy. Investors should be careful not to pay more than is justified by expected risks and returns, unless of course they view any dilution of returns as being worth the positive social and environmental externalities that RPI properties can produce.

Summary and Discussion of Hypotheses

Exhibit 9 summarizes the findings in terms of the percentage change in financial outcomes associated with each type of RPI property. In no case did RPI status diminish income or value to a significant level. In fact, for four of the five property types, RPI status was associated with statistically higher incomes and/or higher values. Of course these premiums, do not necessarily increase returns for investors because higher incomes lead to higher values which generally offset benefits to returns. They do, on the other hand, suggest that the market is capitalizing at least

Exhibit 9 | Percentage Effect of RPI Status on Financial Performance Measures

Property Type	NOI per Sq. Ft.	Market Value per Sq. Ft.	Income Return per Year (Cap Rate)	Appreciation Return per Year	Total Return per Year
ENERGY STAR	2.7**	8.5****	−0.5****	0.0	−0.5
Suburban Regeneration	−3.9	−3.3	−0.3	−0.2*	−2.5*
CBD Regeneration	8.2***	6.7**	0.5*	−0.0	−0.5
Suburban Transit	1.5	10.6****	−0.4****	0.1**	0.7
CBD Transit	−2.5	9.1****	−1.5****	0.0	−0.4

Notes:
*Significant at the .10 level.
**Significant at the .05 level.
***Significant at the .01 level
****Significant at the .001 level.

some of the social and environmental benefits of these types of responsible property investments. They also suggest that there is an opportunity for developers to achieve profits equal to or better than those produced by non-RPI properties, as long as any additional costs do not exhaust the value added by developing RPI properties.

With respect to investment returns, the findings show that for the same four property types that exhibited higher incomes and/or values, the total returns for investors were not significantly different than those for other types of property. This suggests that investors could have held a portfolio of RPI properties over the past 10 years without diluting their returns. For suburban regeneration properties, however, the findings reveal lower total returns, probably because they appreciated more slowly than other suburban properties in response to disappointing incomes. Expectations about these projects may have exceeded real outcomes and additional incentives may be needed to help them compete on equal footing with other suburban locations. They may not be needed, however, if in the future the prices paid for these properties are more in line with the incomes being produced.

The first hypothesis that all the RPI properties have had higher NOIs was confirmed for ENERGY STAR and CBD regeneration properties. But there was no significant difference for the rest of the property types. Incomes produced by the other types were not diluted by their RPI status, but neither did they appear to have benefited from significant comparative advantages. For suburban regeneration properties, any subsidies, planned facilities, potential agglomeration economies, and other advantages may not have been sufficient to offset pre-existing disadvantages. For suburban transit properties, the relative ease of still commuting by car from suburban home sites and the relatively undeveloped suburban transit networks may have prevented them from gaining any real accessibility advantages, so far. And for CBD transit properties, access to good regional bus service (which was not measured), downtown housing, and other amenities may have offset any significant advantages for the CBD transit properties in comparison to other CBD offices.

The second hypothesis that properties near transit and energy efficient properties have had higher values was confirmed. In all these cases, it appears that lower cap rates played a significant role in producing the higher values, so the insignificantly higher incomes were not a limit on their ability to achieve higher market values. The expectation that the results would be ambiguous for the regeneration properties was also confirmed by the finding that regeneration properties in the CBDs had higher values but not in the suburbs. This may indicate that overall regeneration policies and projects are having more success in the CBDs.

Finally, the third hypothesis, that we'd see higher appreciation and lower income returns for energy-efficient and transit properties was partly confirmed. Lower incomes returns were seen but only suburban transit had higher appreciation returns. This suggests that the benefits of energy efficiency and CBD transit were already priced into markets before the study period. Only in the case of suburban transit did additional benefits seem to be ‘‘discovered’’ during the study period, producing a faster than normal rate of appreciation. The expectation that regeneration areas would perform as other properties was borne out for CBD properties but in the suburbs there was underperformance, as already indicated. Again, it seems likely that optimism may have been too high and that suburban regeneration may require more patience and/or incentives to fully achieve its potential.

Conclusion

The objective was to learn how RPI properties have done over the past 10 years in comparison to otherwise similar peers in terms of income, value, and returns. The findings reveal that in nearly every case, investors have not had to accept lower returns in order to engage in RPI. The one exception was suburban regeneration, however, now that prices have adjusted downward, these investments may perform adequately in the future and even outperform if the redevelopment projects they are a part of achieve a critical mass and begin generating significant agglomeration economies. In all other cases, there is no reason for investors to avoid the types of RPI properties studied here. Even suburban regeneration properties could be good investments as long as the prices paid reflect more cautious optimism about the future of these areas. In general, RPI has been a sound investment strategy.

For developers, the opportunities may be even more positive. If RPI properties are 7% to 11% more valuable, then it may be possible to achieve higher development profits as long as costs do not exhaust value premiums.

This question about development costs, however, is one important issue that needs further study. Other topics that seem ripe for future research include the financial performance of other types of RPI properties, such as apartments and retail near transit, and the financial effects of other RPI features, such as walkability (Pivo and Fisher, forthcoming) or the conservation of natural features.

As noted in the introduction, a recent review of studies on social responsibility and business outcomes found that social responsibility neither harms nor improves returns (Margolis and Elfenbein, 2008). The authors conclude that ‘‘companies can do good *and* do well, even if they don’t do well *by* doing good.’’ The findings that in most cases RPI neither harms nor improves total returns, suggest the same conclusion. For developers, however, the opportunities may be better than that, but a more definitive answer to that question must await further investigation.

Endnotes

[1] Some cities grant tax abatements to developers who build near transit. Most of the properties near transit in this study, however, were not built as part of formal transit-oriented development projects and are ineligible for incentives.

[2] Energy-efficient properties may also benefit from incentives offered by government and utilities including tax deductions, utility rebates, low interest loans, and expedited permitting. Utility rebates can directly affect net operating expenses by lowering utility expenditures.

[3] Government incentives can include property tax abatements, sale tax exemptions, income tax deductions, employment credits, no tax on capital gains, increased deductions on equipment, accelerated real property depreciation, and more.

[4] A quarter mile was also used to define properties near transit but the half-mile distance was found to be a better predictor in the models.

[5] ENERGY STAR properties were also separated into CBD and suburban subgroups, with similar results.

[6] A calculation using the mean NOI per square foot and mean cap rate (i.e., income return) from Exhibit 2 produced a mean market value per square foot of about $201. When the NOI was adjusted upward by 2.7% and the cap rate downward by 0.05%, a mean market value of $222 per square foot was produced, which equals a market value premium of about 10%.

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